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P A R T II.

DESCRIPTION OF MALFORMATIONS

(Continued).

DESCRIPTION OF MALFORMATIONS.

MONSTROSITIES.

SINGLE MONSTERS—*Continued.*

CELOSOMA.—In celosoma there is a more or less extensive body-cleft with eventration, associated with various anomalies of the extremities, of the genito-urinary apparatus, of the intestinal tract, and even of the whole trunk. The elder Geoffroy Saint-Hilaire recognized two species in this class, aspalasoma and agenosoma, and his son added four more. The six varieties of eventration are thus described by Isidore Geoffroy Saint-Hilaire:

Aspalasoma.—Lateral or median eventration occupying principally the lower portion of the abdomen: the urinary apparatus, the genital apparatus, and the rectum, open externally by three distinct orifices.

Agenosoma.—Lateral or median eventration occupying principally the lower portion of the abdomen: genital and urinary organs absent or very rudimentary.

Cyllosoma.—Lateral eventration occupying principally the lower portion of the abdomen: absence or imperfect development of the lower extremity on that side occupied by the eventration.

Schistosoma.—Lateral or median eventration extending the whole length of the abdomen: lower extremities wanting or very imperfect.

Pleurosoma.—Lateral eventration occupying principally the upper portion of the abdomen and extending to the anterior portion of the chest: atrophy or imperfect development of the upper extremity on the side occupied by the eventration.

Celosoma.—Lateral or median eventration, with fissure, atrophy, or even total absence of the sternum, and protrusion of the heart.

1. *Aspalasoma*.¹—The openings for the genitalia and bladder are entirely separate and distinct, instead of there being a common opening as usual, and the anus is displaced from its ordinary situation. If the eventration is median the three openings occupy the pubic region. If the eventration is lateral the orifices are displaced toward the side of the eventration.

The elder Geoffroy Saint-Hilaire described a specimen in which the mass of displaced viscera and the placenta were entirely on the right, and in which the orifices of bladder, genitalia, and bowel were in the right groin, between the thigh and the enormous hernial tumor. There is to be seen in these cases, in front of or a little above the pubis, the vestiges of a rudimentary penis or clitoris. The lower extremities are usually curved and imperfectly developed—equally so, if the eventration is median, unequally if it is lateral. The trunk, also, is shorter than normal. The head and upper extremities are usually well developed. Internally, abnormalities are to be noted in the digestive organs. The small intestine and a portion of the large are perfect, but the lower portion of the large intestine is absent. The anus may be absent, or if situated on the anterior surface of the body may communicate with the small intestine, the cæcum, or with a blind pouch representing a rudimentary

¹ ἀσπάλαξ, mole, and σῶμα, body.

large intestine. The liver, stomach, pancreas, and spleen may be displaced downward and form part of the hernial protrusion, but may be otherwise normal. The genitalia and the urinary apparatus are imperfectly developed. In a case described by

FIG. 19.



Lateral abdominal cleft, with protruding liver. The legs are twisted on their long axes so that the toes look backward. (A similar anomaly of the lower limbs is seen in Plate VIII.) The genitalia are represented by two folds of skin, apparently a labium magnum and fused labia minora, and a small clitoris, well to the right, between the tumor and the right thigh. There is a pit in the median line of the perineum, representing the anus, but imperforate. (Mütter Museum, College of Physicians.)

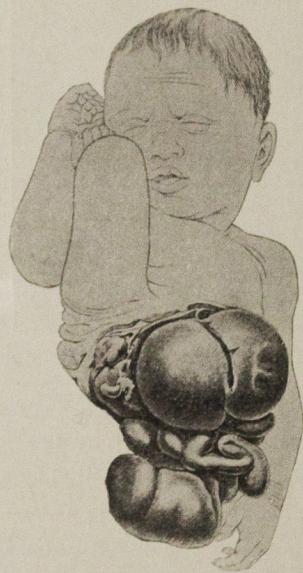
Petit most of the genital organs and the bladder were absent, and the enlarged ureters opened by small orifices externally on either side of the anus. According to Geoffroy Saint-Hilaire, but a few cases of aspalasoma have been described with sufficient accuracy to establish their character. It is probable, however,

that some of the cases of eventration reported from time to time, would, on closer examination, answer this description.

2. *Agenosoma*.¹—Closely resembles the preceding variety, but the genitalia are entirely absent, or present by a rudimentary trace. The intestinal canal, however, is more perfectly formed. The large intestine is developed almost in its entire length. The anus, however, if existing, is situated far forward, at about the point where the external genitals are commonly found. These infants, like those of the preceding class, live at most but a few hours.

3. *Cyllosoma*.²—This class shows the same characteristics as the two preceding, but the eventration being lateral, one inferior

FIG. 20.



Left lateral eventration. Absence of left extremity. (KLEIN.)

extremity is altogether wanting or very imperfectly developed. The other extremity is usually only slightly deformed—a trifle

¹ ἀ, negative, and γεννάω, to beget.

² κυλλάδε, lame, and σῶμα.

crooked, perhaps—but in some cases the deformity may be considerable. (Fig. 20.) The great majority of cyllosomata, as of the two preceding varieties, are of the feminine sex. In forty-eight cases of eventration, the opening was on the left side in thirty-four. (Hallett.)

4. *Schistosoma*.¹—The whole anterior abdominal wall is reduced to a thin covering of peritoneum and amnion, through which the abdominal organs can be seen, or, if the membranes are torn, as is likely to be the case, the viscera are entirely uncovered. The lower extremities are ill-developed, rudimentary,

FIG. 21.



Pleurosoma. Left upper extremity represented by a mere stump. Extensive eventration. (HERTWIG.)

or altogether absent. Even the pelvic bones may be wanting. The intestinal canal is incomplete and the sexual and urinary organs ill-developed. According to Geoffroy Saint-Hilaire this form of monstrosity is very rare. (Plate VIII.)

5. *Pleurosoma*.¹—A lateral eventration, usually on the left side, involving the chest and the upper portion of the abdomen. The viscera are covered only by the thin amnion continuous with the covering of the cord, and the peritoneum, and possibly pleura. (Fig. 21.) The upper extremity on the affected side is ill-developed or absent. Its insertion may be abnormal, displaced either inward or downward. In one case the rudiment of the arm was attached to the cartilage of the sixth rib. (Ahlfeld.)

6. *Celosoma*.²—In this variety not only is there eventration of the abdominal organs, but through a fissure in the sternum or through a gap due to absence of the sternum, the thoracic organs, principally the heart, protrude as well.

The heart, in this variety, with its abnormal position, shows also abnormalities of development. The pericardium is imperfect, the auricular and ventricular septa are incomplete, and in a case cited by Geoffroy Saint-Hilaire, and in one described by Hallett, both ventricles discharged their contents into a common arterial trunk. In this species, as in the preceding varieties, the infant is either born dead or lives at most but an hour or two.

From the fact that the organs of the trunk are displaced more or less from the thoracic and abdominal cavities, and because of the pulling of the omphalic duct and umbilical vesicle, from a very early period, upon the spine, producing a sharp bend anteriorly, the body is shortened, even more than in the preceding varieties; the genitalia, if present, are displaced backward, and the lower limbs appear to be attached to the posterior aspect of the body—the heels, in some cases, resting upon the occiput. Matthews Duncan and Hurry³ endeavor to explain the “retroflexion of the fœtus,” by the assumption that on account of a very short cord, or its entire absence, the

¹ πλευρά, side, and σῶμα.

² κήλη, hernia, and σῶμα.

³ London Obst. Trans., vol. xxvi. Also, Dakin, *ibid.*, vol. xxxii.

anterior face of the foetal body is brought into close apposition with the uterine wall, and that thus the foetal body is bent backward by the contour of the uterine wall. (Figs. 22 and 23.)

FIG. 22.



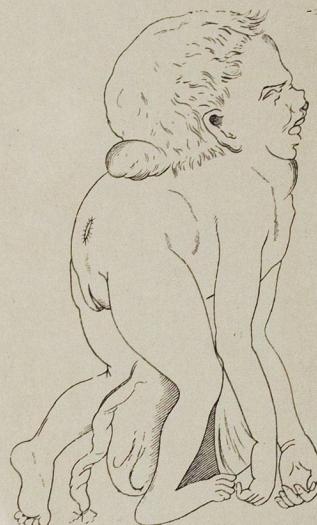
Eventration with retroflexion of the fetus. The body-cleft extends downward and lays open the bladder. (VROLIK.)

But the fallacy of this explanation is demonstrated by cases like that represented in Plate IX., in which the cord is exceedingly short, but in which there is no retroflexion; and, on the other hand, by the cases in which the cord is of normal length, and the spine is, nevertheless, bent acutely forward. Duncan attempts to account for the latter fact by the supposition that the cord is shortened by encircling the foetal neck; but this *ex parte* argument is strained, to say the least. We believe the explanation given by Ahlfeld to be correct, namely, that the spine is bent forward on account of the pull upon it

early in its development, by the omphalic duct acting through the medium of the mesentery.

In all forms of celosoma the umbilical cord may present anomalies. In Plate IX. the vessels of the cord may be seen implanted in the wall of the hernial tumor, and much shortened. The placenta may be adherent by its foetal side to the infant's abdominal viscera. The cord may be entirely absent, the vessels

FIG. 23.

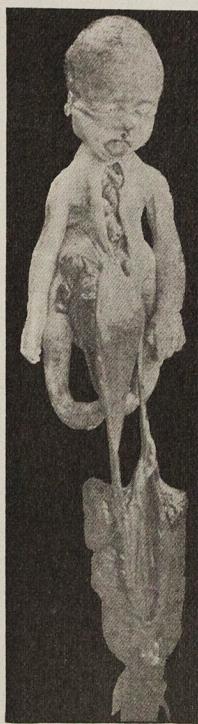


Eventration with partial retroflexion and shortening of the trunk. (POTTHOFF.)

passing directly from the placenta to the liver and abdominal cleft. Ahlfeld declares that he could find no anomalies in the placenta. It is asserted that these monsters in labor commonly present, not in their longitudinal axis, but by the displaced abdominal viscera. (Figs. 24 and 25.) Geoffroy Saint-Hilaire asserts that the sexual apparatus is normal in celosoma properly so called, but in the reproduction from a photograph in our possession it will be seen that the sexual organs are wanting. In two of the three specimens belonging to the species celosoma in our collection, there is spina bifida with a large meningocele.

The artificial division of cases of imperfect closure of the thoracic and abdominal walls, made by Geoffroy Saint-Hilaire, serves a useful purpose in permitting a separate description of the various kinds and degrees of body-clefts with associated anomalies in development. It is not to be supposed, however,

FIG. 24.



Celosoma. The placenta hangs from the abdomen by a short cord and a band of amnion.

FIG. 25.



Celosoma. Absence of anal, sexual, and urinary apertures. Club-feet and sacral tumor.

that specimens will show the sharply defined characteristics of a single class. Several of the conditions described under different headings may be found in one body. Many exceptions to the general rules laid down may also be observed. The cleft being confined to the abdomen, the lower extremities may be perfect

and the upper extremities imperfect. (Otto, Cam.) The cleft being well to one side, the corresponding limb may be well formed and the opposite limb defective. (Humby.) The same condition may be associated with an equal degree of deformity in both limbs. (Hallett, Fingerhault.) Moreover, while the associated anomalies in the limbs are usually by defect, they may be by excess, as in polydactylism. (Hasenest, Hallett.)¹

The chief factor in the causation of the body-clefts just described is to be found, undoubtedly, in the formation of amniotic adhesions early in embryonal life, which lead to the close approximation of the foetal body to the internal wall of the ovum at the future site of the placenta, and prevent the complete closure of the centripetally growing body walls. The umbilical region is peculiarly liable to disturbances of development, with the result of imperfect union, for it is the last portion of the anterior surface to close, and gapes widely up to a comparatively late date of development. At the tenth week coils of intestine may be found projecting into the cord and attached to the omphalic duct. This structure then atrophies and disappears, or is ruptured, permitting the retraction of the intestines within the abdomen. Should the duct, abnormally resistant, fail to give way, the intestines are pulled out further and further as the amniotic cavity enlarges, thus preventing the closure of the umbilical ring, and resulting finally in complete eventration. Moreover, the pull upon the intestines, being at right angles to their course, lifts the lower gut toward the centre of the abdomen, and thus causes the atresia ani which is so common in all cases of celosoma, for the depression of the skin toward the end of the gut, which it meets and opens into, is prevented by

¹ "Monsters with Eventration," Edinb. Medical and Surgical Journal, vol. lxviii., 1847. A valuable monograph with full descriptions of dissections.

the high situation of the latter. (Ahlfeld.) Other causes for the clefts of the abdominal walls have been found in adhesions of the intestines to the inner coat of the abdominal ring; in a collection of fluid within the abdominal cavity; in enlargement of some of the abdominal organs, and in a diminished spherical curvature of the vitelline surface.

EXENCEPHALUS. PSEUDENCEPHALUS. ANENCEPHALUS.—

Under the names exencephalus, pseudencephalus, and anencephalus, are described malformations of the head which consist mainly in defective development of the cranium and of the cranial contents, with displacement of the latter in the exencephalic specimens.

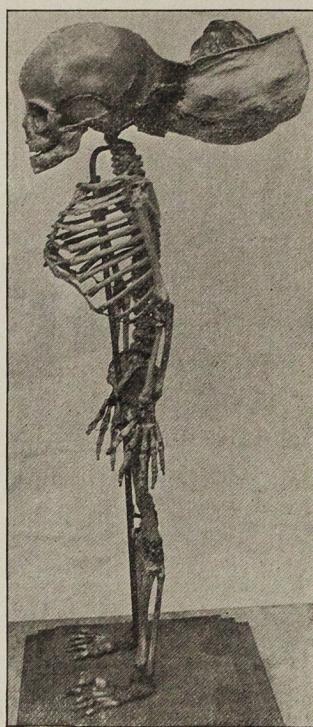
EXENCEPHALUS.—Exencephalus is characterized by a malformed brain situated at least in part without the cranial cavity, the bony walls of which are themselves imperfect. (Is. Geoffroy Saint-Hilaire.) The specimens of this nature are divided into two main classes—those with and those without a spinal fissure. The former class is further subdivided into the sub-species iniencephalus and exencephalus; the latter into notencephalus, proencephalus, podencephalus, and hyperencephalus.

1. *Notencephalus*.¹—In this deformity the cranial contents are in large part without the skull, resting upon the back of the neck like a huge “waterfall,” but not adherent. The tumor protrudes through a fissure or aperture in the occipital bone (Fig. 26), and its size depends upon the amount of brain tissue and fluid which it contains. The latter is usually found in considerable quantities—for hydrocephalus, to some degree, is almost always present. The tumor, therefore, may be a hydronephalocele or an encephalocele, usually the former. The sac

¹ *νῶτος*, back, and *εγκέφαλος*, encephalus.

which contains the encephalus is composed of skin and brain membranes. The opening into the cranium is often regular in outline, confined to the occipital bone, and of varying extent.

FIG. 26.



Notencephalus (hydrencephalocele posterior). There is a round opening between the two halves of the occipital bone at the occipital protuberance, beneath which the halves are united by a comparatively broad band of dense membrane. The posterior arch of the atlas is imperfect, and there was a direct communication between the spinal canal and the hydrencephalocele. (Pathological Museum of the Philadelphia Hospital.)

A fissure, however, may reach below to the posterior arch of the atlas, and even through the arches of the first few cervical vertebrae. (Figs. 27 and 28.) In consequence of the absence of a large portion of the skull contents the cranium is misshapen, the forehead sloping backward, the supra-orbital plates tilted in the

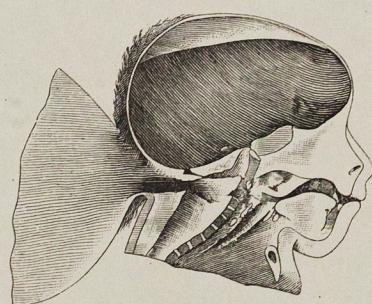
same direction, and the eyes, in consequence, directed upward and standing out prominently. Infants thus deformed live but a few hours, should they be born alive. The deformity can occasion the same difficulties in labor as are encountered in

FIG. 27.



Notencephalus. (BAR.)

FIG. 28.

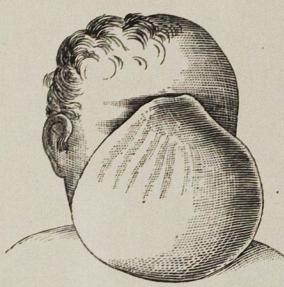


Notencephalus. (BAR.)

simple hydrocephalus, and it may be necessary to puncture the sac and to evacuate its contents. But usually the sac is so compressible that even a very large hydrencephalocele may be squeezed through the birth-canal without difficulty. In several reported cases podalic version was found the best means of terminating labor.

2. *Proencephalus* (encephalocele or hydrencephalocele frontalis or anterior).—In proencephalus the hernia of the brain, or the hydrencephalocele, is situated anteriorly, and emerges through an abnormal opening or gap piercing the cranium in this situation. It often protrudes through the frontal suture near the fontanelle, or very commonly at the glabella. The tumor is, as a rule, small, but in one case contained almost the whole left hemisphere. An illustration of a minor grade of this deformity is given in Part I., in which the protrusion may be

FIG. 29.



Proencephalus. (NIEMEYER.)

FIG. 30.



Proencephalus. (CLAR.)

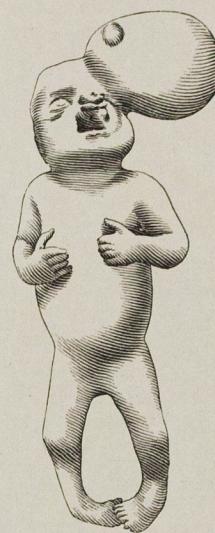
The hernia is at the sella Turcica, and the tumor has forced its way forward from that point.

seen just above the root of the nose. Such a case, if the hernia is large, should be included in this category, although Geoffroy Saint-Hilaire makes a separate division, among the hemiterata, for encephalic hernias at the base of the brain. The orbit may be the point of exit for the brain tumor. According to Houel an encephalocele or hydrencephalocele at the base of the brain is comparatively rare. Thus, of ninety-three cases, sixty-eight were in the occipital region, sixteen in the frontal region, and nine at the base of the brain. A curious variety of

the last named is the hydrencephalocele palatina, in which the dura mater, distended with serum, projects into the mouth, forming a tumor possibly as large as a small apple. (Virchow, *Geschwüste*.)

3. *Podencephalus*.—In this variety the defect in the cranium is on the vault of the skull, and the cranial contents protrude

FIG. 32.



Podencephalus. (Mütter Museum,
College of Physicians.)

FIG. 31.



Podencephalus. (BENEKE.)

from the top of the head. The opening in the skull may be small, and, while allowing the escape of the greater portion of the fluid encephalus, forces the tumor to assume a pedunculated character. (Fig. 31.)

The opening may be situated in any of the sutures of the cranial vault, in the neighborhood of the greater fontanelle, or in the squamous portion of the temporal bone. (Fig. 32.) Ordinarily the vault of the skull is flattened and may in extreme cases be brought almost in apposition with the base. In a case

described by Vrolik the brain tumor protruded through the sagittal suture, and the anterior fontanelle forcing the parietal bones outward and downward so that the encephalus overtopped

FIG. 33.



Podencephalus. (VROLIK.)

FIG. 34.



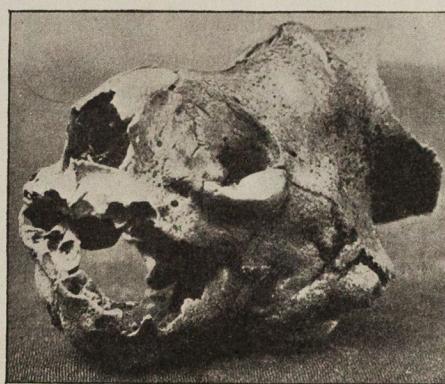
Podencephalus. (BISSELL.) The dotted line on the head represents the size of the opening into the skull. The cranial bones have been so closely approximated from lack of intra-cranial pressure that the cranial cavity is almost obliterated. The brain is rudimentary and the hydrencephalocele small.

the head like the cap of a grenadier. (Fig. 33.) The bones of the skull in this sub-species present a more or less natural development and are not markedly atrophied.

There is almost always some degree of hydrocephalus, usually considerable. On this factor mainly depends the size of the tumor, which may equal or surpass the size of the foetal

head, although the brain shows the same tendency to assume an unnatural bulk when relieved from confinement within the cranium, as the liver does in a like condition in celosoma. The tumor is covered by the thinned-out hairy scalp, and the sac walls proper are the brain membranes.

FIG. 35.



Skull from child represented in Fig. 34. The opening has been formed at the middle of the sagittal suture, by forcing back the edges of the parietal bones. All the cranial bones have grown inward toward the centre, and they are firmly joined to one another by bony union. The lower and upper jaws are fused into one bony mass on the right side. To the left the lower jaw is distorted, as shown in the photograph. Hydrocephalus must have developed comparatively late in this case, destroying the brain by pressure, forcing a passage-way externally through the sagittal suture, and allowing the approximation of the cranial bones by the evacuation of the cranial contents.

4. *Hyperencephalus*.—In hyperencephalus one sees the same deformity as in podencephalus, but in a higher degree. The bones of the cranial vault are ill-developed or almost absent, constituting a fringe of bone around the base of the encephalus. The scalp is more or less well preserved, covering the meninges except in small areas, where it is absent, exposing to view the dura mater. There is often hydrocephalus, and the body is likely to be deformed in other regions.

5. *Iniencephalus*.—In this there is the same deformity of the skull as in notencephalus, with the addition of a spinal fissure involving the cervical and thoracic vertebræ. (Fig. 37.) In consequence of the ill-development of the posterior portions of the cervical vertebræ there is a lordosis in this region, and perhaps a compensatory kyphosis of the upper thoracic vertebræ, as shown in Fig. 38, extending the head and allowing it to sink

FIG. 36.



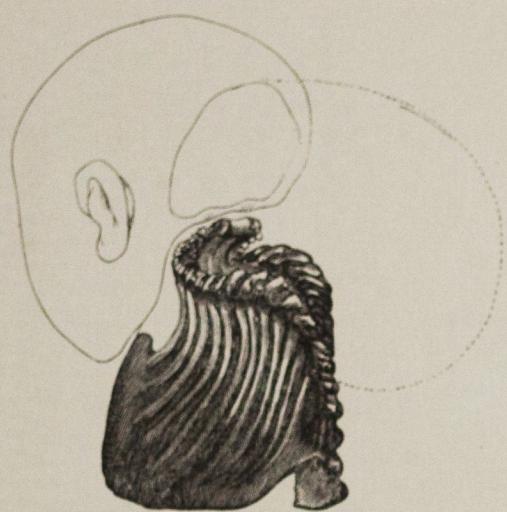
Hyperencephalus. (Mütter Museum, College of Physicians.)

between the shoulders, and giving the foetus an attitude characteristic of many forms of deficient head and spine development. As in all cases in which the cranial contents are displaced, the skull is more or less flattened. A curious condition in this division is seen in cases of deficient development of the occipital region and of the spine, with absence of brain and of a cystic tumor, the skin simply closing over the back of the head and neck, as in Fig. 39.

6. *Exencephalus*.—In this malformation there is an arrested development of the bones of the cranium; the brain, more or

less imperfectly formed, has escaped from the cranial cavity and lies upon the back, and there is an extensive spina bifida. (See

FIG. 37.



Iniencephalus. (BUDIN.)

FIG. 38.



Iniencephalus. (BUDIN.)

FIG. 39.



Iniencephalus. (FLECK.)



Exencephalus. (HILDRETH.)

Fig. 40; also Plates X. and XI.) The head is extended and is depressed between the shoulders, and the rudimentary frontal

bones slope backward, giving to the head and face an appearance already described, and allowing the brain mass to rest upon the infant's back instead of upon the base of the cranium.

PSEUDENCEPHALUS AND ANENCEPHALUS (*Hemicephalus, Acrania*).—In a more advanced degree of the malformation of the cranium considered above, the bones of the vault and the brain may be absent altogether, or represented by a few rudiments. There may be a partial development of the frontal, parietal, and occipital bones, but they slant inward toward a middle point and are not prominent. The brain is often represented by a bunch of membranes, bloodvessels, connective, and possibly nervous tissue, on the base of the skull. To the latter condition Geoffroy Saint-Hilaire gave the name pseudencephalus, reserving the term anencephalus for those cases in which there was neither a trace of brain nor a rudimentary representative of it. The same observer divides the anencephalic monsters into derencephalic and anencephalic varieties. In the former the bones of the cranial vault are rudimentary, the posterior portion of the occiput is absent, and the upper cervical vertebræ are bifid. In the latter the spinal canal is laid open more extensively and the spinal cord is absent. Of the pseudencephalic monsters a division is made into nosencephalus, thlipsencephalus, and pseudencephalus proper. In the first, the cranial cavity is exposed by the absence or imperfect development of the frontal and parietal bones; the occiput is pretty well preserved, and the spine is not opened. In the second, the exposure of the base of the skull is more extensive by the involvement of the occipital bone and even the upper vertebræ. In the third, there is the same condition with a greater involvement of the vertebræ. This is a refinement of classification, however, that is quite unnecessary, and is not now employed. Indeed, it

is customary to speak of all specimens in this division as anencephalic. A useful distinction is that between cases in which the occiput and spine are preserved intact, and cases in which the two halves of the occiput are separated and the spinal canal is opened. The appearance of the two is quite different, and, in the former, extra-uterine life of short duration is possible.

Strangely enough, anencephalic foetuses are usually of the feminine sex. The development and nutrition of the rest of the body is usually good: the broad shoulders and the generally plump appearance presenting a curious contrast to the deformed head. The attitude of the latter is most peculiar. It is sunk between the shoulders and extended. The eyes stand out from the face and look upward. The base of the skull is narrow. The nose is broad and flat and the mouth partly open. Anencephalus is a comparatively common condition; there are few general practitioners of experience who have not seen examples of it, and it has probably been known though not understood in all ages of medicine. Geoffroy Saint-Hilaire showed to the Academy of Paris, in 1826, an anencephalic infant that had been found among some Egyptian mummies, and had been brought to Europe by Passalocqua. (Fig. 41.)

Anencephalus may complicate pregnancy by permitting a too great descent of the presenting head into the pelvis, giving rise to exaggerated irritability of the bladder. In labor, the over-developed shoulders may obstruct the descent of the child and may call for podalic version. An anencephalic child is apt to be born prematurely and usually presents by the face. It is claimed that the condition can be diagnosticated during pregnancy by the existence of hydramnios and modifications of foetal movements. The latter are exaggerated in intensity, are felt successively at points far distant from one another, and are

spasmodic and irregular in character.¹ In labor—if, as is usual, the head, or rather the face, presents—the condition can easily be made out, as a rule, by digital examination.

It must be obvious that all the varieties of head deformities described from notencephalus to anencephalus are closely related

FIG. 42.



FIG. 41.



Mummy of an anencephalus. (GEOFFROY
SAINT-HILAIRE.)

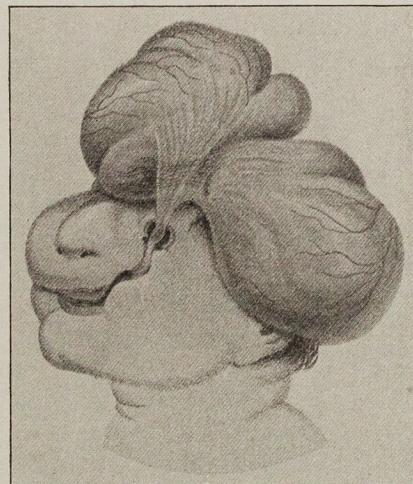
Rupture of brain and membranes
in the young embryo, with remnants
of the sac still hanging to the head.
(RUDOLPHI.)

to one another, and are often the varying effects of a common cause. This cause is most often hydrocephalus. If the serum accumulates early within the ventricles, the brain and its cover-

¹ Laulaigne: Thèse de Paris, 1883.

ings are ruptured at about the fourth week of embryonal existence; they atrophy and disappear, and the result is anencephalus. The accumulation of serum may make it impossible for the bony case of the brain to inclose the cranial cavity, causing thus defects of varying extent in the skull through which the brain membranes and their contents protrude. Amniotic adhesions to the scalp have been given as the most frequent cause of encephalocele and hydrencephalocele, but the regular

FIG. 43.

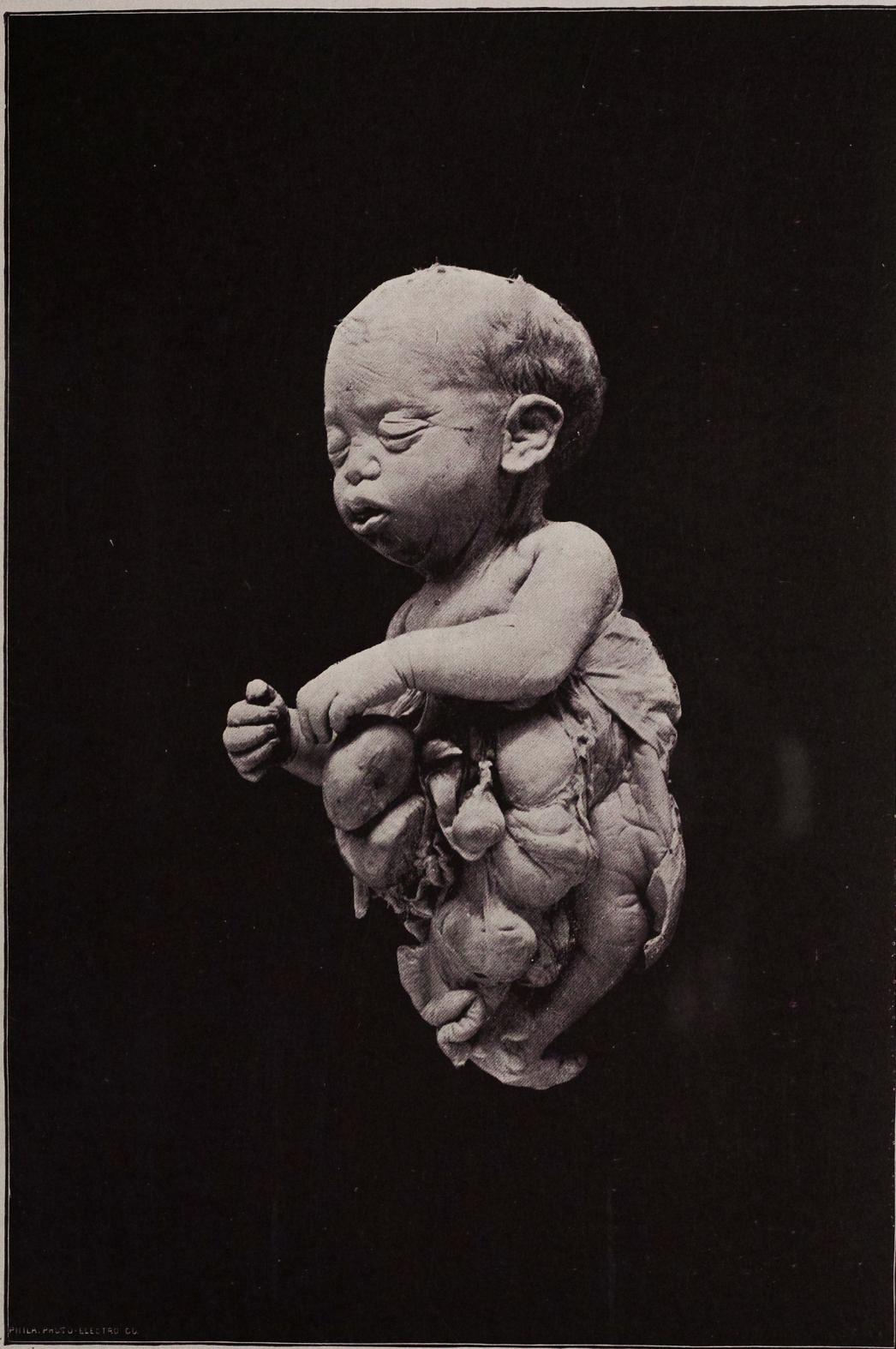


Exencephalus from amniotic adhesions. (LANNELONGUE and MÉNARD.)

occurrence of these tumors in the median line speaks for hydrocephalus as the cause. (Ahlfeld.) In the case of true hernia cerebri without hydrocephalus, an arrest of development in the cranial bones, that allows a protrusion of the brain through an unnatural aperture, must be regarded as the explanation. This arrest of development may have been due to an early hydrocephalus which has been cured, or may be the result of amniotic adhesions. (Fig. 43.) If the hydrocephalus develops later, when the bony case of the brain is better developed, the

cranial contents are forced out through the fontanelles, the sutures, or apertures in the bones themselves, which are unnaturally widened by the increased intra-cranial pressure. If the serous effusion affects the spinal canal as well as the cranial cavity, before the closure of the former, which is thus prevented, there is an associated spina bifida. In the case of exencephalus, the hydrocephalus may have been external and have ruptured the outer case of the brain, or prevented its development, leaving the latter compressed and ill-developed but not destroyed. It is conceivable in this last instance that a simple arrest of development or that amniotic adhesions may have played a causative rôle, but hydrocephalus is probably the sole etiological factor in the vast majority of cases.

PLATE VIII.



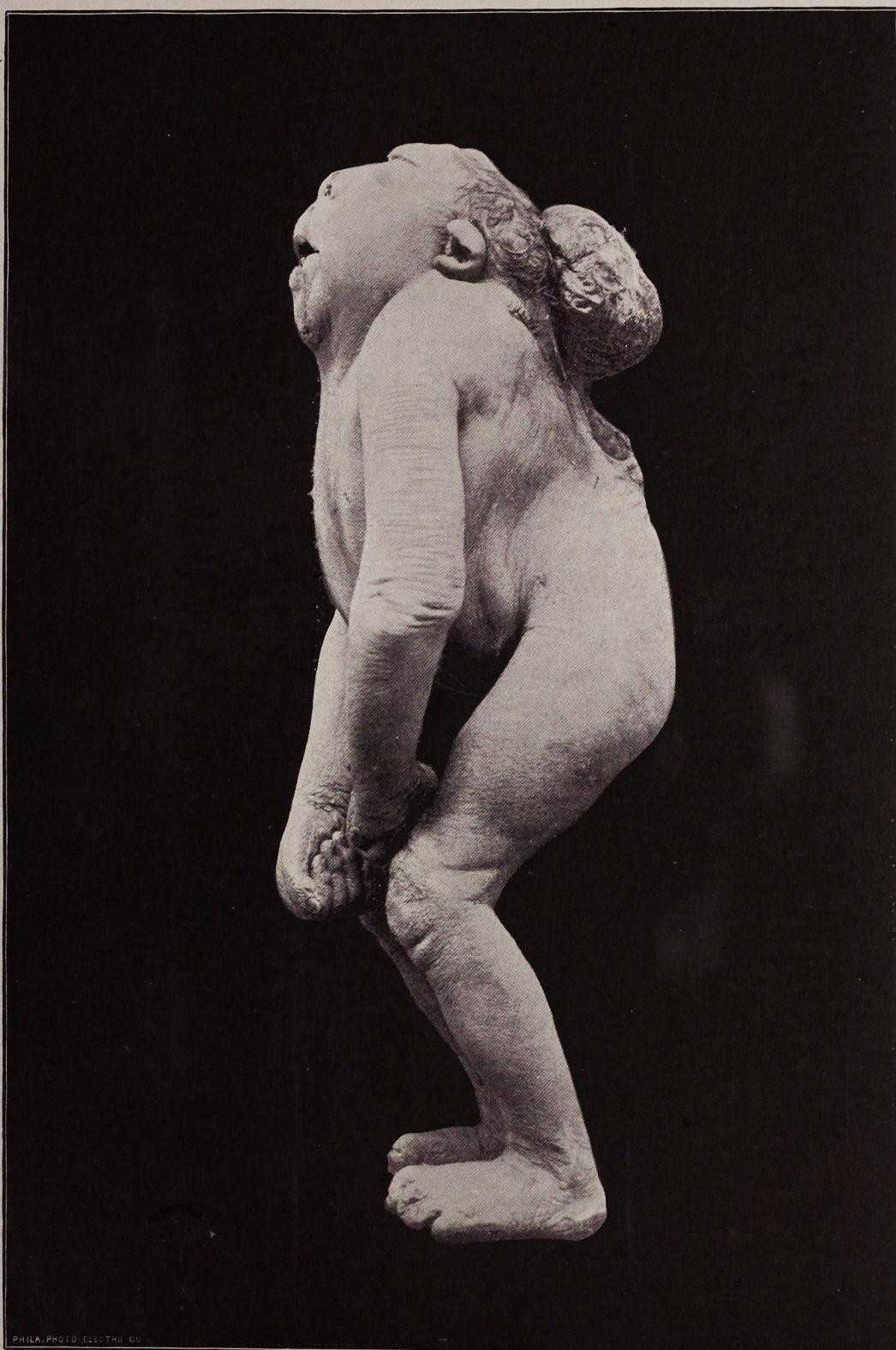
SCHISTOSOMA.

PLATE IX.



ASPALOSOMA.

PLATE X.



EXENCEPHALUS.

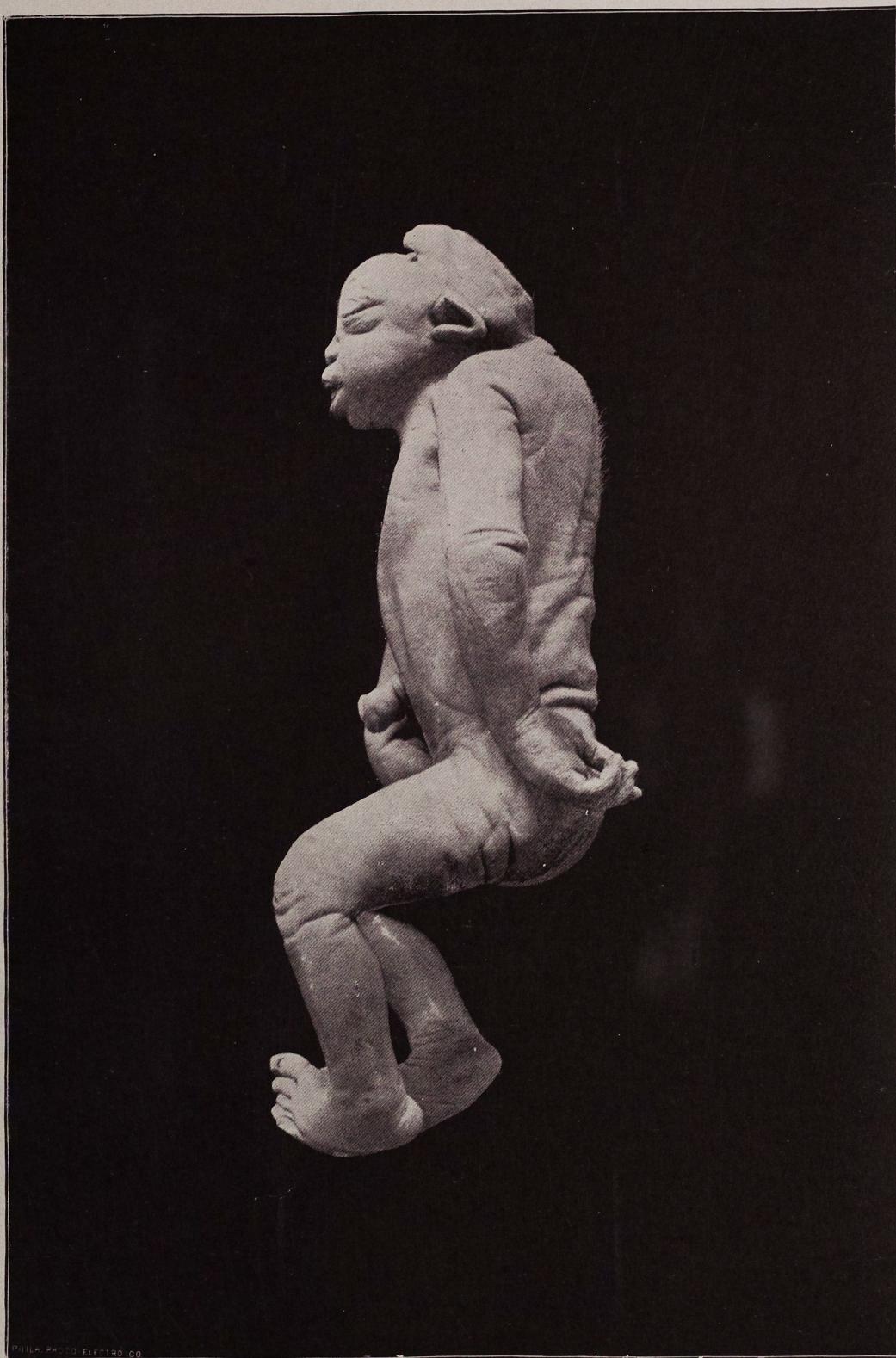
PLATE XI.



EXENCEPHALUS.

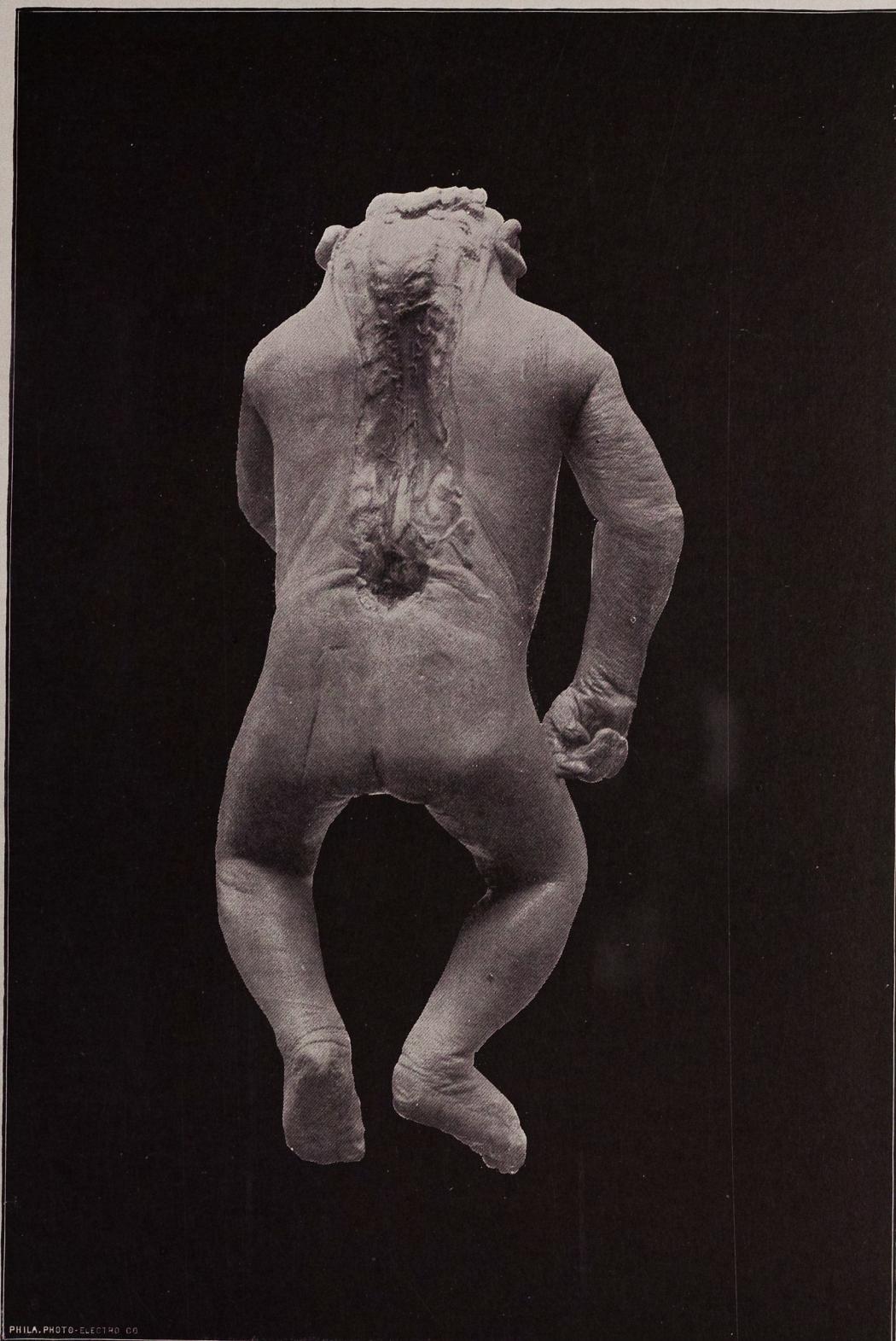
(REAR VIEW.)

PLATE XII.



PSEUDENCEPHALUS.

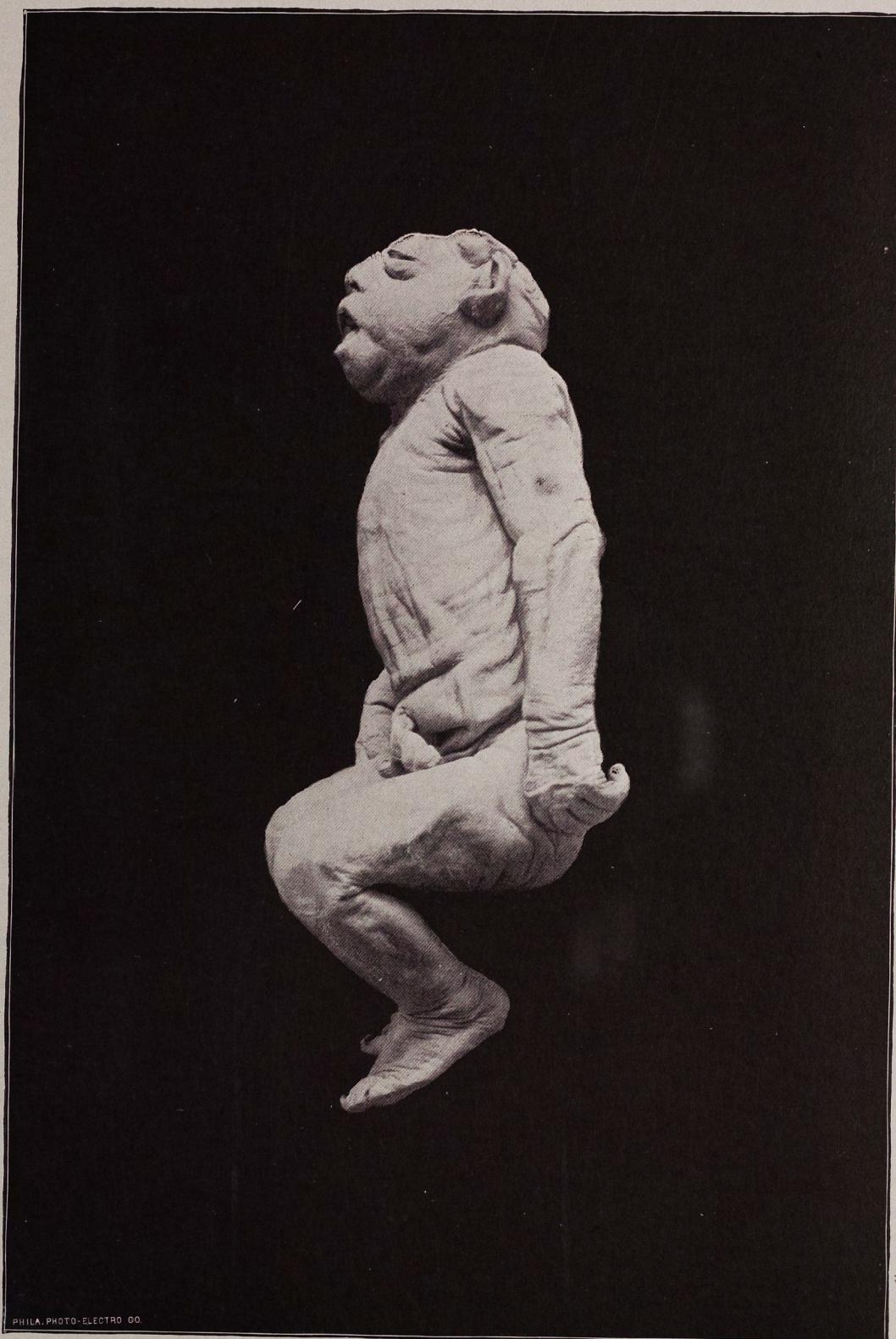
PLATE XIII.



PSEUDENCEPHALUS.

(REAR VIEW.)

PLATE XIV.



PSEUDENCEPHALUS.

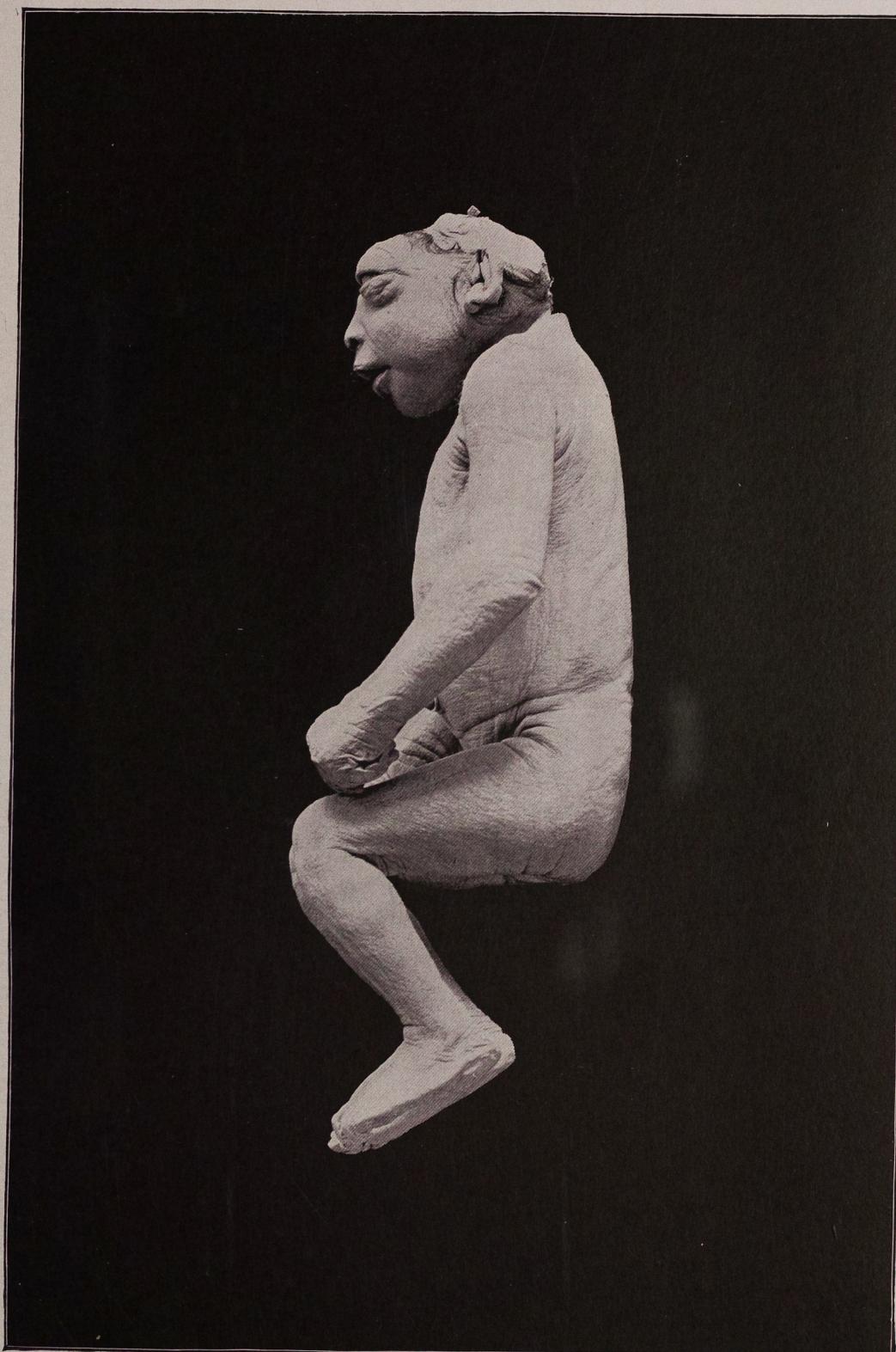
PLATE XV.



PSEUDENCEPHALUS.

(FRONT VIEW.)

PLATE XVI.



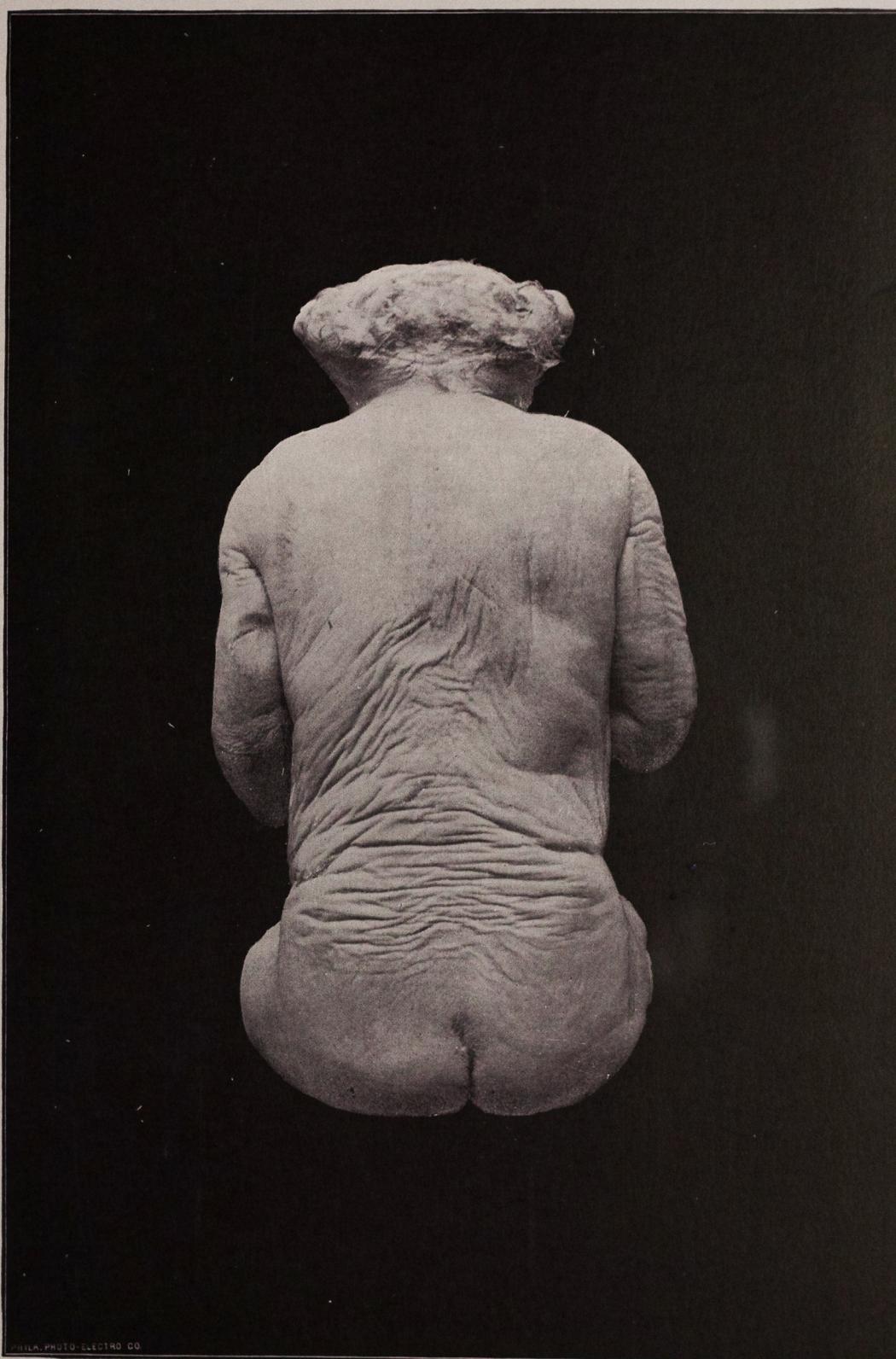
PSEUDENCEPHALUS.

PLATE XVII.



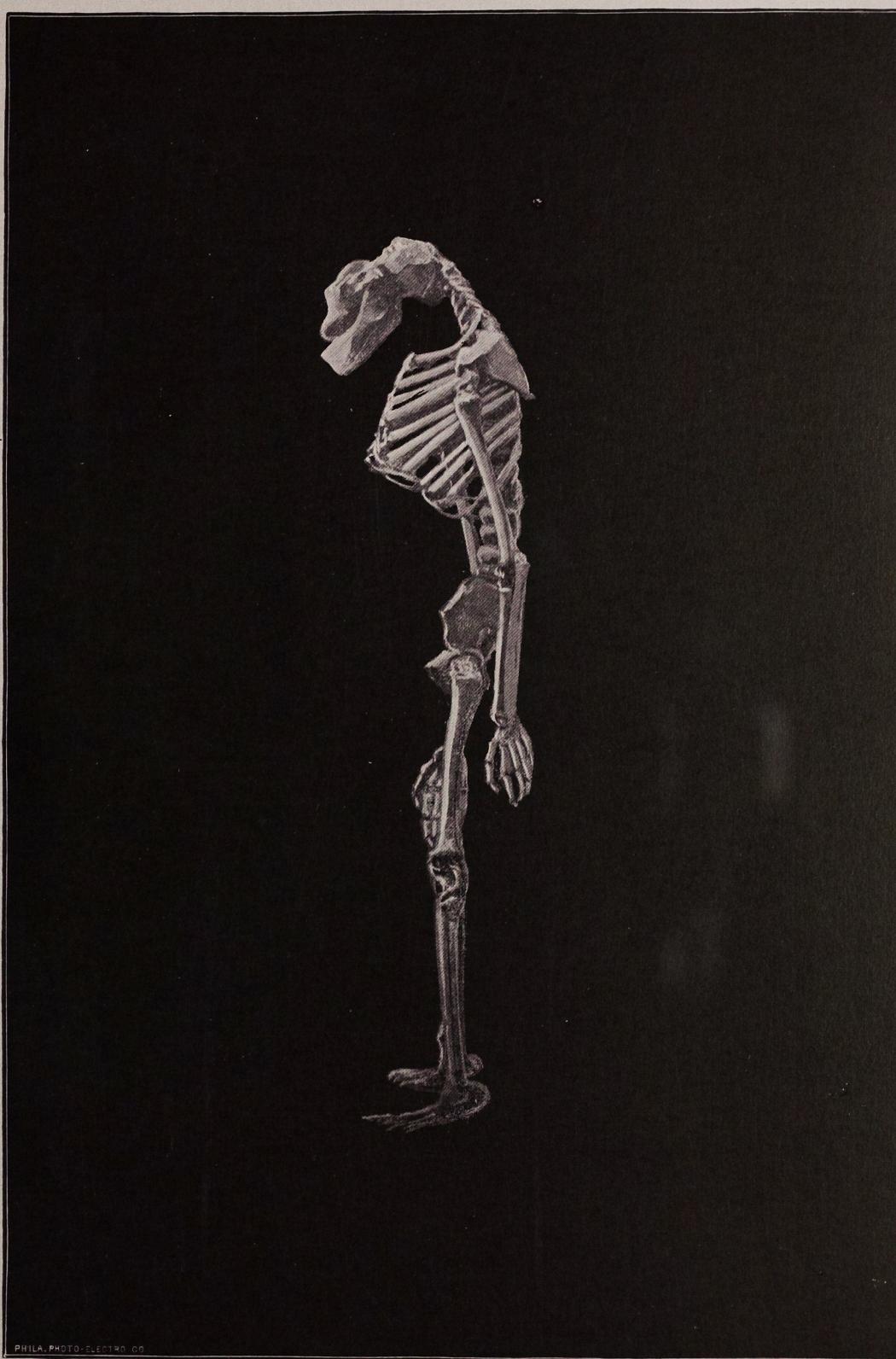
ANENCEPHALUS.

PLATE XVIII.



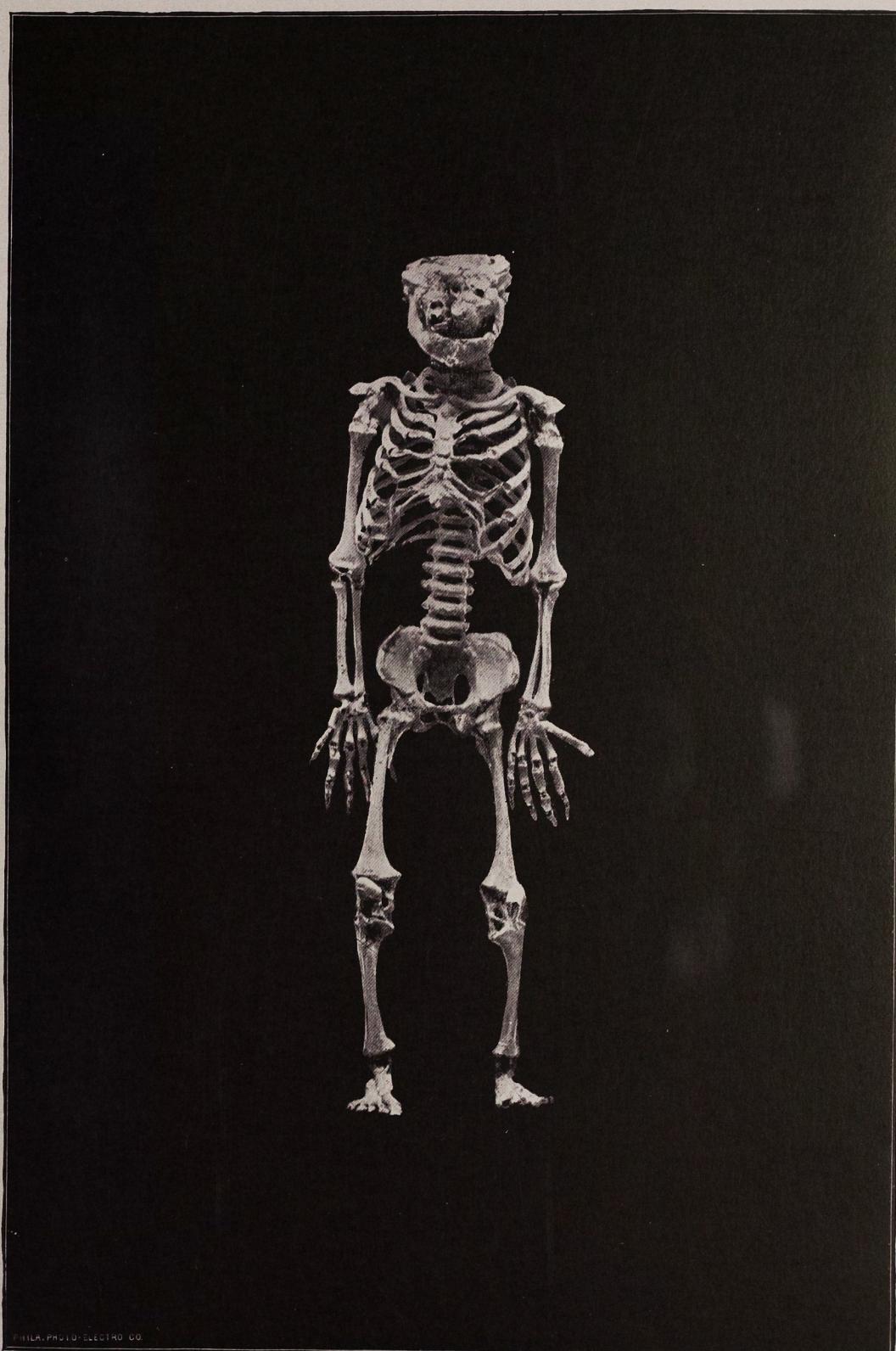
ANENCEPHALUS.

PLATE XIX.



SKELETON OF ANENCEPHALUS.

PLATE XX.



SKELETON OF ANENCEPHALUS.

